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(54) Apparatus and method for collectively performing tile-based image rotation, scaling and digital halftone screening.

(57) A tile-oriented technique and associated apparatus for manipulating a continuous tone (contone) image through image rotation, anamorphic scaling and digital halftone screening for use in illustratively implementing a page description language. Specifically, an incoming contone image is first partitioned into aligned non-abutting tiles (e.g. 215_1, 215_2,..., 215_9). Overlapping blocks (e.g. 217_1, 217_2, ..., 217_9) are then defined which will hold output data for corresponding tiles. To effect rotation and anamorphic scaling of the contone image, two-dimensional sampling increments, in fast and slow scan directions, are defined to relate movement between successive pixels in an output block to movement between corresponding pixels in the contone image. Similar, though independent, sampling increments, also in th fast and slow scan directions and based in part upon scre n angle and screen ruling, are defined for mov m nt betwe n successiv pixels in a halftone reference cell. To generate output data for each successive pixel location in a block, incremental sampling occurs in the contone image to yield a corresponding sampled contone value. This value, in conjunction with incremental halftone sampling addresses, then defines a sampling location that is read in a halftone reference plane (e.g. 242_{181}), the resulting output of which is single bit halftone data that defines a writing spot. Each tile in the contone image is successively processed, using two nested loops (1950, 1960), with resulting output data for that tile being written into appropriate pixel locations in a corresponding block in the output image. Clipping variables, incrementally varying in two-dimensional fashion and in unison with the contone pixel sampling location, define valid output data for a conton tile that is to be written into a corresponding block.

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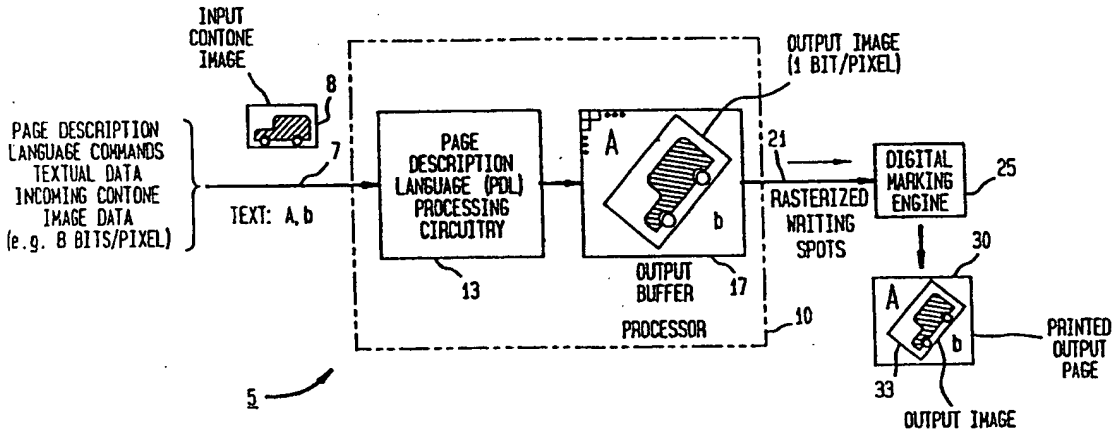
FIG. 1


INPUT CONTONE IMAGE
8
PAGE DESCRIPTION LANGUAGE COMMANDS TEXTUAL DATA INCOMING CONTONE IMAGE DATA (e.g. 8 BITS/PIXEL)
7
TEXT: A, b
PAGE DESCRIPTION LANGUAGE (PDL) PROCESSING CIRCUITRY
13
A
b
OUTPUT BUFFER
17
PROCESSOR
10
OUTPUT IMAGE (1 BIT/PIXEL)
21
RASTERIZED WRITING SPOTS
DIGITAL MARKING ENGINE
25
30
A
b
PRINTED OUTPUT PAGE
33
OUTPUT IMAGE
5

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EUROPEAN SEARCH REPORT

Application Number
EP 92 42 0264

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.5)
A	US-A-4 916 545 (GRANGER) * column 15, line 8 - column 30, line 12; figures 1-9 *	1-38	H04N1/40 G06F15/16 G06T3/00 H04N1/393
D,A	US-A-4 918 622 (GRANGER ET AL.) * column 12, line 11 - column 25, line 20; figures 1-9 *	1-38	

TECHNICAL FIELDS SEARCHED (Int.Cl.5)

G06T
H04N
G06F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
BERLIN	8 December 1994	MATERNE, A

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
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T : theory or principle underlying the invention
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D : document cited in the application
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